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ABSTRACT

This descriptive report looks at Pensacola Junior College's (PJC's) efforts to: (1) define the competencies students are to acquire through the college's vocational and general education programs; and (2) map out a sequence of courses for each program, based on a hierarchical ranking of these competencies. The report first discusses an employer survey conducted to identify requisite, on-the-job skills for a variety of occupations, providing examples of survey instruments itemizing competencies for paramedics, draftspersons, and auto body repair workers. The report then describes the ordering of the identified competencies, starting with the highest-level competency and working backward through sequential, prerequisite skills. The program maps which were based on these hierarchies are presented for programs in paralegal training, building maintenance, and food service management. These maps graphically portray course sequences leading to associate degrees or certificates. After a discussion of the usefulness of these maps for communicating program content, the report examines the rationale upon which PJC plans to determine competencies, prerequisites, and course sequences for general education programs. Under this rationale, courses will progressively strengthen the students' decision-making skills by providing information on scientific, political, and cultural issues. A general chemistry course chart is provided as an illustration of how unacquired competencies delimit the student's decision-making capabilities. (JP)

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INSTITUTIONAL CHANGE THROUGH DEFINING PROGRAM COMPETENCIES

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Vice President of Academic Affairs
Pensacola Junior College Florida

Paper presented to
Florida Association of Community Colleges
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November 14, 1980

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INSTITUTIONAL CHANGE THROUGH DEFINING PROGRAM COMPETENCIES

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Pensacola Junior College Florida

The most predominant characteristic of junior college people is that we are never satisfied. At our college, just like yours, we have every right to be complacent; but at our college, just like yours, we are not satisfied.

We look at our occupational programs and ask

1. Have our program graduates learned what the employer expects them to know? Do they have the competencies employers expect?
2. Are we structuring these learning sequences in the most effective and efficient way?
3. Do students who begin the program have the necessary prerequisite skills?

Following from this discontentment, we initiated a project with the purpose of attacking systematically those three persisting questions.

First, do our graduates have the competencies the employer expects? I don't know--what does the employer expect? To find out, we began working with the advisory

TRANSPARENCY - 1 -

PARAMEDIC SKILLS

	NECESSARY	DESIRABLE	UNNECESSARY
Take patient history			
Physical examination			
General appearance, level of consciousness			
vital signs			
head-to-toe survey (inspection/palpation)			
auscultation of heart			
auscultation of lungs			
auscultation of abdominal sounds			
evaluation of neurological status			
evaluation of neuromuscular functions			
Peripheral venipuncture			
Draw blood sample			
External jugular venipuncture			
Subclavian venipuncture			
Assemble IV equipment			
Calculate IV flow rate			
Establish lifeline with			
over-the-needle catheter			
winged infusion device			
inside-needle-catheter			
Use of MAST suit			
Calculate drug dosage			
Draw up medication in syringe from ampule/vial			
Administer drugs from prepackaged disposable syringe			
Give subcutaneous injection			
Give intramuscular injection			
Give intravenous medication thru IV insertion site			
Head tilt			
Triple airway maneuver			
Crossed-finger technique			
Manual sweep of mouth			
Back blows			
Abdominal thrust			
Mouth-to-mouth ventilation (infants, children, adults)			
Oxygen masks, nasal cannulas			
Demand Valve			
Oropharyngeal airways			
Nasopharyngeal airways			
Pocket mask			
Bag-valve-mask and reservoirs (adults, children)			
Oro/nasopharyngeal suctioning			
Tracheal suctioning			
Tracheotomy suctioning			
Direct laryngoscopy			
Insertion of endotracheal tube (adults, infants)			

TRANSPARENCY -2-

EMPLOYER SURVEY

DRAFTING TECHNOLOGY

	GRADUATES HAVE A GOOD WORKING SKILL	GRADUATES NEED MORE EDUCATION IN THIS AREA	GRADUATES ARE LACKING IN THIS ABILITY		IS USED IN DAY-TO-DAY PRACTICE	IS SOMETIMES NECESSARY	IS NOT A NECESSARY SKILL
Beam Design							
Column Design							
Steel Tables							
Concrete Placement							
Re-Bar Schedules							
Load Calculations							
Foundation Design							
Millwork Details							
Truss Analysis							
Deflection							
Joist Span Data							
HVAC Loads							
Plumbing Risers							
Design							
Perspectives							
Model Building							
REFERENCE MATERIAL							
Dictionary							
American Institute of Steel Construction Manual							
Architectural Graphic Standards							
Southern Standard Building Code							
Escambia Co. Electrical Code							
Pensacola Electrical Code							
National Electrical Code							
Florida State Energy Code							
Escambia Co. Building Code							
Nation Fire Protection Agency Code							
Pensacola City Fire Code							
Pensacola Building Ordinances							
Pensacola Zoning Ordinances							
Florida Hotel & Restaurant Commission Code							
Escambia County Plumbing Code							
Santa Rosa Island Authority Building Code							
Sweet's Catalogs							
Manufacturers Catalogs							

COMPANY'S NAME _____

ADDRESS _____

_____

TRANSPARENCY - 3-

EMPLOYER TASK EVALUATION INSTRUMENT

AUTO BODY REPAIR

	NECESSARY	DESIRABLE	UNNECESSARY
1. Inspect body and frame and measure alignment			
2. Straighten, repair and align body and frame of vehicle			
3. Striaghten deformed auto body sheet metal			
4. Remove and install weld-in panel			
5. Align hood and deck panels			
6. Remove and install fenders			
7. Remove and install doors			
8. Remove and replace bumpers			
9. Replace fiberglass body panels			
10. Repair fiberglass panels			
11. Estimate cost of repairs			
12. Align head lamps			
13. Fill and smooth depressed areas with body filler			
14. Pick, file and finish metal			
15. Shrink damaged metal areas			
16. Weld vehicle body parts			
17. Weld frames or frame horns			
18. Fill depressed areas with body solder			

	NECESSARY	DESIRABLE	UNNECESSARY
19. Replace moldings and hardware			
20. Remove and replace grills			
21. Replace locks and latches			
22. Repair manual seat tracks			
23. Remove, replace and adjust power			
24. Repair or replace window raising and lowering mechanisms			
25. Repair power window control units			
26. Remove and replace seat and shoulder belts			
27. Remove damaged door glass and install replacement			
28. Remove front and rear windows and install replacement			
29. Seal leaks around windshield, rear window and back lights			
30. Adjust or align windows in doors			
31. Determine repair costs			
32. Order parts and materials			

committees and the employers. We asked: Are these the competencies you expect? What are other competencies that we have not listed? Transparencies 1, 2, and 3 are examples of the type of direct surveys that were mailed out. After receiving the employer expectations, the faculty would take the information and restate those expectations. First, they would be constructed as behaviorally stated objectives; then they would be translated and redefined as competencies. Through this process, the occupational program would become competency based. We would talk in terms of the competencies we expect the graduate to have; we would talk in terms of what the graduate can specifically do. We would identify ways of observing the performance of these competencies and of evaluating the level of degree of the accomplishment. The key element in the process was the reliance upon the employer to tell us what he expects.

We learned many things from employers. Technology had changed jobs. Skill requirements had changed, but we also learned that other competencies were expected. The employer wanted safety-minded persons. He wanted someone who understood customer relations; someone who understood industrial relations; and someone who could communicate. The direct job skills (welding, typing, surveying, cooking) equipped the graduate to <u>begin</u> the job. The related skills (safety, human relations, communications) equipped the new worker to <u>keep</u> the job.

The next step in the process was program structuring. What was the proper sequence of content? The task was to arrange the content into the most logically and pedagogically sound sequence. The structuring began by first asking "What is the last thing that must be learned? What is the last competence that must be acquired? After that was answered, the next question was: What competence must one have in order to do that last thing? After that answer, then: What competence must one have to do that? And, what competence must one have to do that? In other words, we started breaking down the program beginning with the last day and we moved down through the requisites until we got to the first day. To summarize, we found the answers to the questions: What competency will the graduate have his last day? What competency must the student have his first day?

When we completed the sequencing of the program, we had a hierarchy of competencies, an identification of prerequisites, an elimination of the extraneous, and had created a map. This map, which led us through the program, was referred to as a program map. Transparancy Nos. 4, 5, and 6 are examples of program maps.

Transparency 4 is a program map for the two-year Legal Assistance curriculum. Visually we can see that the program is made up of four discrete components. At the bottom we find economics, algebra, logic and accounting. These form a frame of reference and the basic prerequisites for all

core courses, and quite obviously, should be taken first.

The legal assistant core courses are prerequisite to the speciality courses (for simplicity the exact courses in these two components are not listed). Notice, too, that a fourth component is the legal system and writing and research courses. These can be considered pre- or corequisite courses.

Transparency 5 is the building maintenance program. At the bottom left we find three courses: safety, English, industrial relations. These are prerequisite to all, but the dotted line means that they are not absolutely essential as prerequisites. At the right are two other courses: blueprint and math. Unquestionably, these are prerequisites.

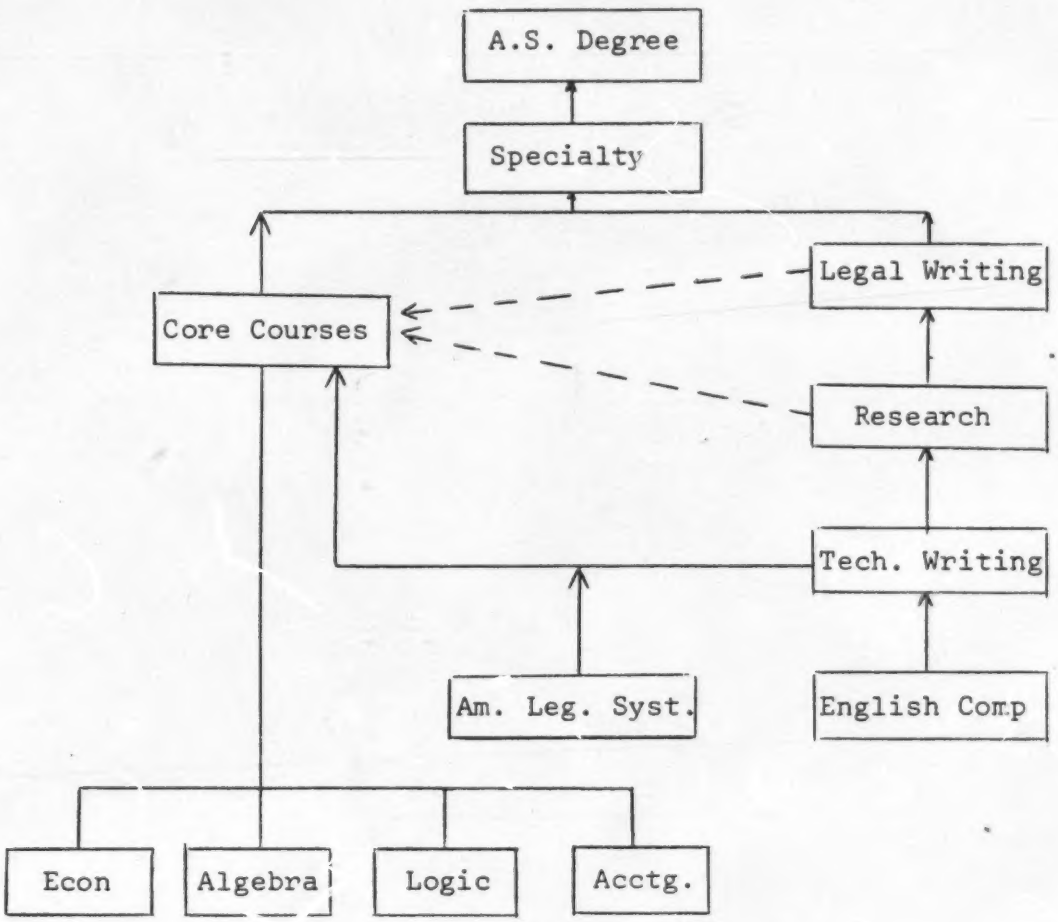
The level of courses BMT 0101 through BMT 0111 are not dependent upon each other. Each is discrete: the course titles are carpentry, plumbing, electricity, etc. They may be taken in any sequence. The top row, BMT 0102 through BMT 0122 are not dependent upon each other, but each has its own prerequisite below. The lower course is carpentry; the upper course is advanced carpentry.

The last course BMT 0109 is the culmination of all courses. This has as its prerequisites, all of the other courses. (It is scheduled for a six week summer term and is the only course taken.)

Transparency 6 is Food Service. This represents one of the more complex maps. Along the left side are 4 general courses which do not contribute directly to the terminal competencies with the exception of English at the bottom.

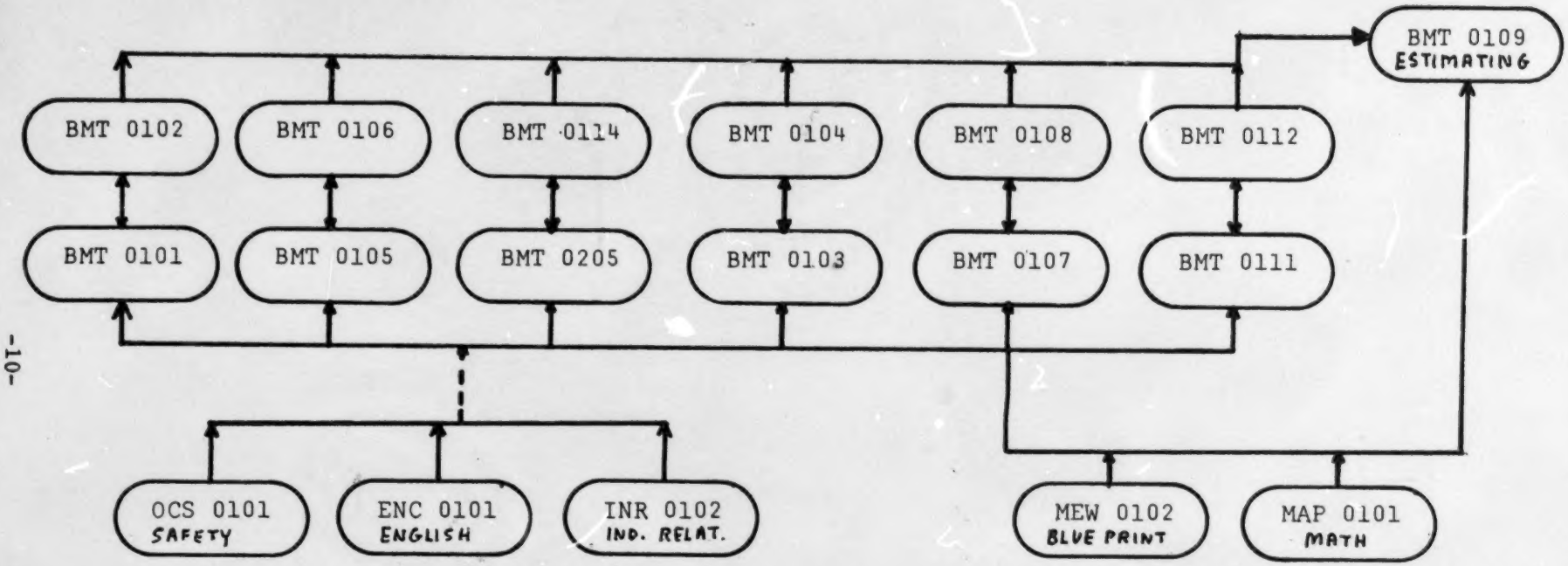
TRANSPARENCY -4-

PROGRAM MAP: LEGAL ASSISTANT



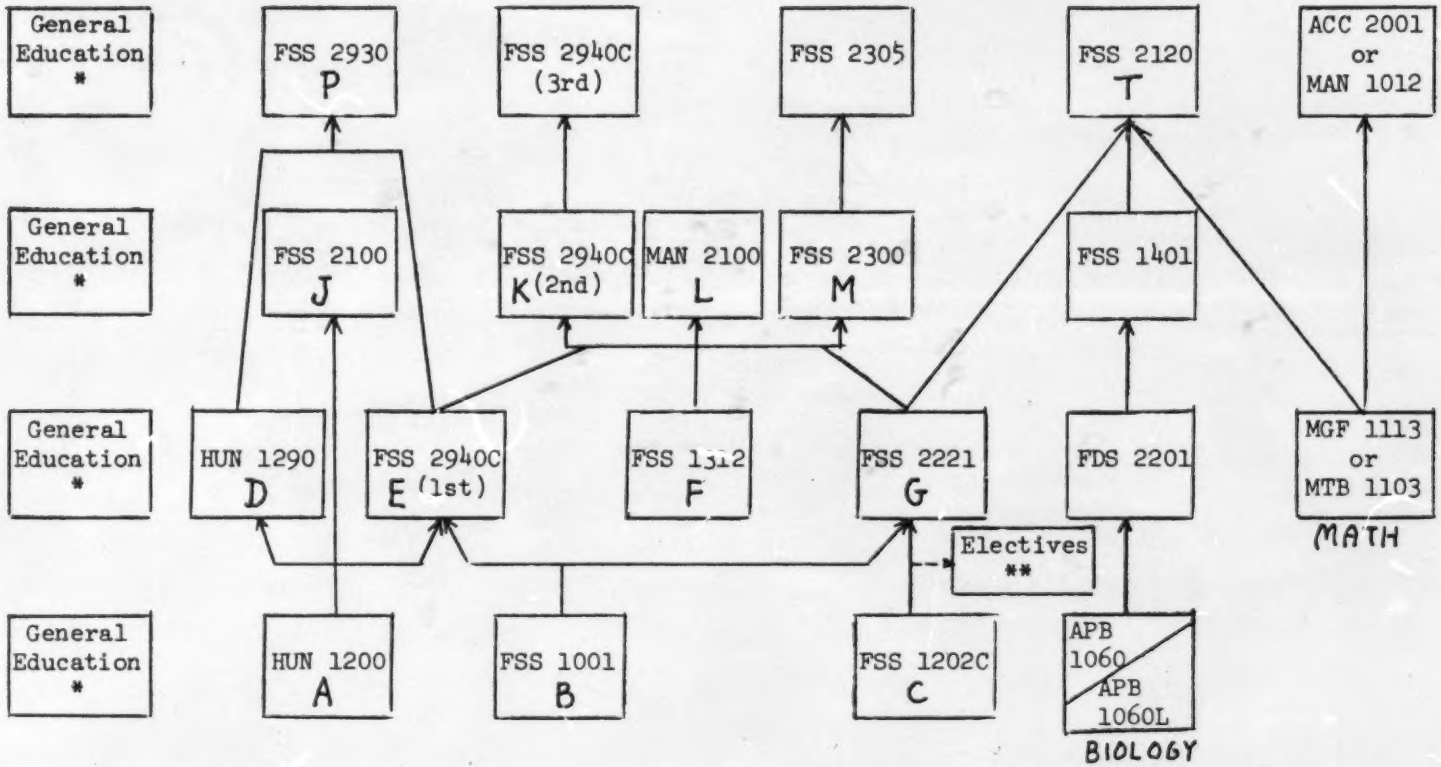
TRANSPARENCY -5-

PROGRAM MAP
BUILDING MAINTENANCE TECHNOLOGY CERTIFICATE



-10-

PROGRAM MAP FOR A.S. DEGREE IN DIETETIC TECHNOLOGY - FOOD SERVICE MANAGEMENT



*General Education:

ENC 1103 English Composition
SSL 1011 Social Science Survey
OR
PSY 2012 General Psychology
CHM 1015 Chemistry (or Physical Science)
AMH 1550 American Constitution

** Electives

FSS 2284 Catering
FSS 2244 Convenience Foods
FSS 2210 Meal Planning & Table Service

TRANSPARENCY -6-

-11-

Courses A, B, C and Biology are the foundation. Notice that A is the prerequisite to J. B is the prerequisite to E and G. C is prerequisite to G, and biology is prerequisite to H.

In the next level course D and E are corequisites and are prerequisite to P. Corequisite courses E and G are prerequisite to the cluster K, L and M. At the right we see math as the prerequisite to T and to accounting.

Thus the program map has some very powerful advantages over the more traditional way of communicating program content. The program map visually portrays the instructional components. As such, it is an excellent tool for communicating. The simple graphical display is understandable by students, teachers, parents, and counselors.

The change to competency-based education through the process I have described has given us four assurances.

1. Program beginners have the necessary prerequisite competencies.

2. The program structure leads to the acquisition of defined competencies.

3. The program completers have the competencies that employers expect.

4. The same process is used to update and revise the program.

5. The ultimate quality control is the partnership between the faculty and the employers.

So far our attention has focused upon occupational education. We have now decided it is time to broaden our view and direct our attention to general education, liberal arts, and university transfer. This is the new focus. But how does the previous work in occupational education relate to general education? The relationship is simple, the methodology previously described is content-free. By that, we mean, it works with any content--with any discipline. The methodology is identification of competencies, identification of prerequisites, and structuring the content sequence.

First we must define the objective of general education. What competency do we expect from our graduate? Frequently, we talk about general education in terms of a distribution of courses--science, math, humanities, social science. But, what competency are we talking about? Are we talking about literacy, or skills, or understanding? These words are vague, and it is hard to get faculty committed to vagueness. We are searching for a nucleus around which to coalesce our efforts.

Another approach might be to ask the question, "What is the most important competency expected of the citizen of a free and democratic society?" Some people believe it is decision--the ability to decide. In a democratic society, the citizen decides and therefore directs society.

How do we teach the skill, or competence, of decision

making? We teach it by practice; we give the student practice in making decisions. In the process of practicing the decision making, the student becomes an active participant in learning, not just a mere passive receptor. If decision making is our basic goal, then what is the limiting factor to one's ability to make decisions? The limiting factor is the relevant information one can bring to the question. Or, stated another way, it is the knowledge one has that is relevant information one can bring to the question. Thus, to summarize our three basic assumptions:

> The most important competence is decision making.
>
> The best way to teach decision making is by practicing decision making.
>
> The limiting factor to decision making is one's background of knowledge.

Therefore, our focus of general education may become: deciding scientific issues, deciding political issues, deciding cultural issues, and ultimately, deciding scientific-political-cultural issues. In this latter case, the limiting factor to one's competence in decision making is a background of knowledge. The basic building block to achieving this decision making competence is the individual course. Now we are home free. We teachers understand the course. We teachers delight in the content. Our goals become quite simple:

We shall produce citizens who can decide issues in our discipline.

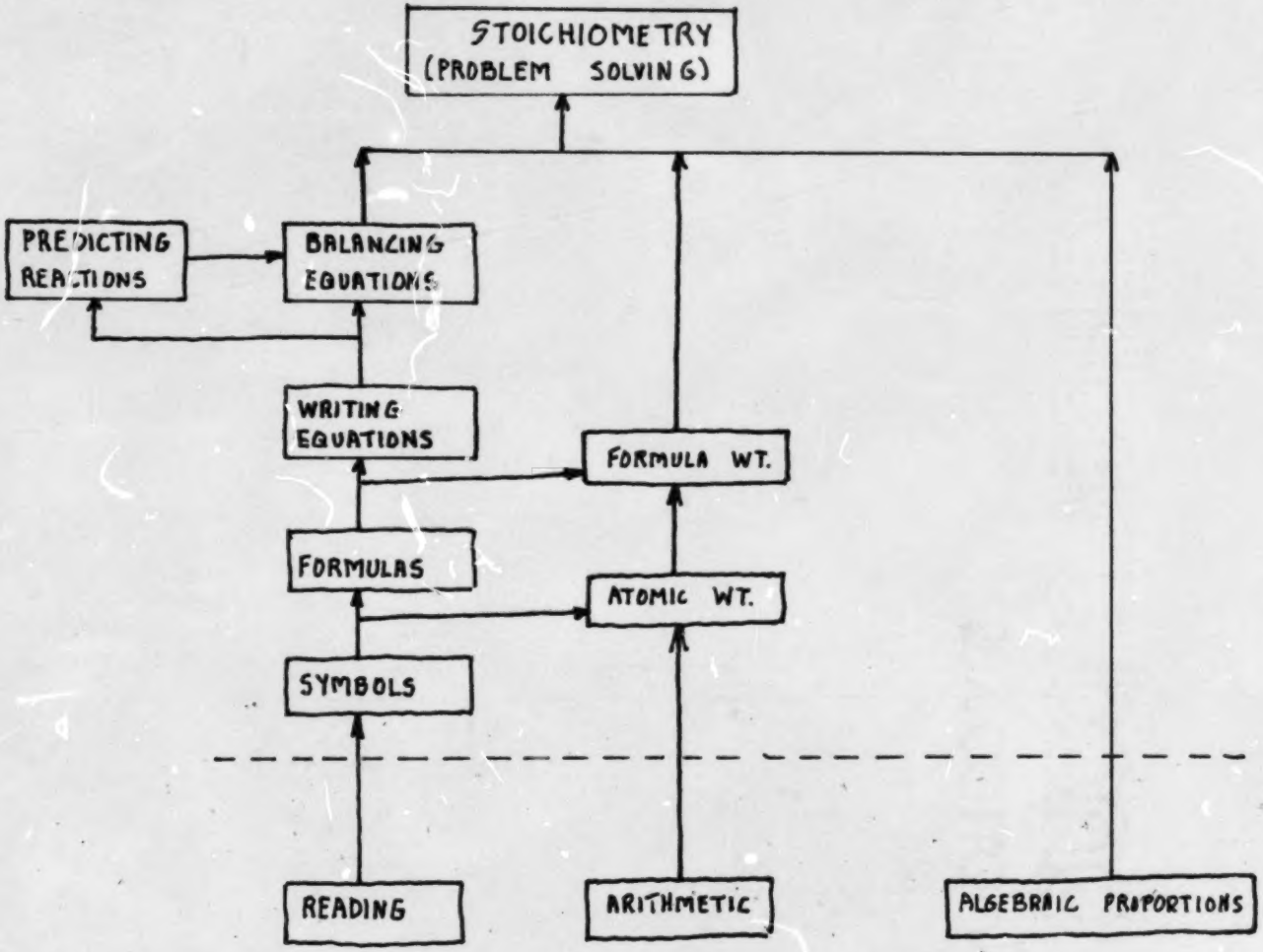
We shall provide the student with the body of knowledge and competence that he/she needs.

We shall provide the student with practice in making decisions by using that knowledge and those competencies.

We must communicate our instructional plans as simply as possible.

We found in our process of program mapping the occupational curriculums that this means of visualizing the structure of a program was clear and powerful. We are, therefore, adopting a process whereby we map our course. We would do this by asking the same basic questions. First, what are the major objectives we wish to accomplish? Second, what are the prerequisites to each of these objectives? Third, which of the prerequisites are my responsibility? We have not yet finalized the process. Let me, however, give you one example of the process of course mapping. Transparency 7 portrays a single terminal objective of a general chemistry course--stoichiometry (problem solving). The map shows that to work the problem requires a competence in balancing equations, which requires a competence in formula writing and that requires a knowledge of symbols.

It also requires a competence in determining formula



TRANSPARENCY -7-

-16-

weights, which requires a competence in atomic weights. Observe that atomic weight requires arithmetic and a co-requisite of formulas.

Three related competencies are listed: reading, arithmetic and algebraic proportion. These are clearly indicated as competencies one must bring to the course. They are not taught in the course.

Finally, the chain effect of unacquired competencies is very graphically shown. If, for example, only 80% achieve the competence of "symbols", then that is the limiting factor to the achievement of all other competencies in that chain, and becomes the limiting factor to the terminal objective. If only 60% achieve the metric competence, then the maximum achievement of the terminal objective can be no more than 60%, and of the 60% who achieved the metric competence, how many of them were among the 30% who failed to master "symbols". Thus the achievement of the terminal objective will probably be even less than 60%.

At the beginning I said I would tell you where we are--how we got there--where we are going. Competency-based education is paying off at Pensacola Junior College. We have over 50 occupational programs using the competency-based education approach and program mapping. We know what we are teaching; why we are teaching it; and can document that the student is learning it. Why is our next focus going to be on general education? Because we are tired of being called

upon to answer the question of

> "Why do you make the students waste their time with art, history, music, biology, and political science?"

We are tired of defense. We want to play offense. We want to get out there first and say this is the purpose of general education. These are the competencies the student will acquire.

For general education, then, our goal is to be able to say with certainty what competencies we are teaching; why we are teaching them; how we know they have been learned. So, why the interest in general education? We all know that even without general education we shall survive. How many of us believe that without general education we can truly thrive?

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